

# 2000 Restoration



▲ **Once believed to be extinct**, the Sonoma spineflower occurs today only on the coastal prairie of Point Reyes National Seashore. In 2000, NPS resource managers and the Point Reyes National Seashore Association established a second population of the species from seed.

*When a species goes extinct locally you can do a great deal, still. You may have lost some of the genetic diversity, but there is still the option of transplanting, of reintroducing species, and rebuilding local populations.*

—E. O. Wilson  
Harvard biology professor, naturalist, and author

Like human beings, park ecosystems in modern landscapes occasionally require “medical” attention to maintain their health. Information on park vital signs is being developed through the NPS Inventory and Monitoring Program to help park managers recognize when changes in certain key species or natural processes in parks are cause for action. For example, a rapid population decline in a species may signal the need for intervention to stop it; the information may also indicate the need for further study to understand cause-and-effect relationships and to guide ultimate restoration. As the following articles indicate, in 2000 the National Park Service sought to restore several plant and animal species and natural processes that were in decline. They also illustrate the increasing awareness among park managers of the benefits of working with adjacent landowners and other partners to restore park ecosystems to health.

## Vegetation

### Restoring the abundance of the endangered Sonoma spineflower

By Michelle Coppoletta and Barbara Moritsch

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*Perhaps restoring diversity is most of all about restoring hope.*

—Reed F. Noss  
Restoring Diversity:  
Strategies for Reintroduction of Endangered Plants

Hope was restored in 2000 for the long-term protection of the federally listed, endangered Sonoma spineflower (*Chorizanthe valida*). The plant, which had last been recorded in 1903, was presumed to be extinct until botanist Wilma Follette discovered specimens in a grazed pasture on Point Reyes National Seashore, California, in 1980. Until now this population was the only known in the world. By combining efforts, however, the Point Reyes National Seashore Association and NPS vegetation managers established a second population on the seashore in 2000.

The original Sonoma spineflower population on the Point Reyes peninsula occurs on 2.5 acres (1 hectare) of coastal prairie. However, plant collections from the 1800s indicate that the flower formerly had a much broader range in Marin and Sonoma Counties. Intensive agriculture and urbanization since the early 1900s have significantly altered the habitat. Information from research suggests that today the species is limited by its dependence on grazing by cattle or wildlife, which reduces competition with nonnative plants, and its restriction to well-drained, disturbed, sandy soils. These ecological requirements, in addition to narrow endemism, render the plant particularly vulnerable to events such as disease outbreak, fire, flood, and other circumstances that could eliminate the population and cause extinction.

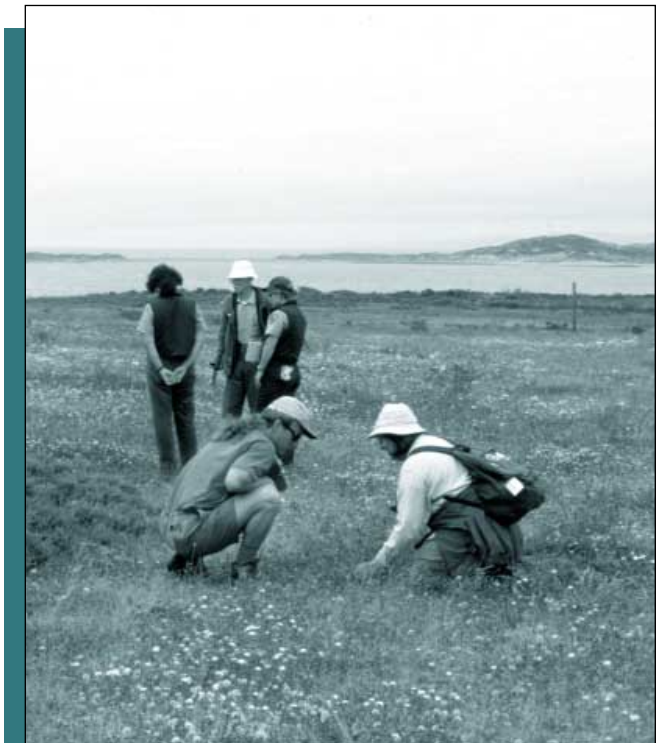
*“The Point Reyes National Seashore Association and NPS vegetation managers established a second population [of the endangered Sonoma spineflower].”*

In 1999 the Point Reyes National Seashore Association provided the vegetation management program of the national seashore with funds for monitoring, evaluating, and expanding the existing population of the Sonoma spineflower and for developing management in accordance with the recovery plan of the U.S. Fish and Wildlife Service. According to the recovery plan, the species cannot be delisted until two additional populations are established and sustained.

By consulting historical records, soil maps, and local plant taxonomists, and by conducting field searches to identify potentially suitable habitat, the vegetation managers of the national seashore identified suitable sites for trial plantings with seeds from the existing population. Seeds were also placed in long-term storage in the

seed bank facility of the Rancho Santa Ana Botanical Garden. A trial site was selected in similar habitat at another location on the national seashore, and in fall 1999, cattle troughs were removed, the soil was lightly disturbed with a rake, and 1,000 seeds were planted.

In 2000, seeds on the trial plot yielded 34 plants, all of which produced flowers and many of which later set seed. With additional funds from the association in 2000, the natural resource managers of the national seashore established two more plots within 565 feet (200 meters) of the first trial plot and planted them with seed from the first population.



▲ Natural resource managers and California Native Plant Society volunteers census the main population of the Sonoma spineflower each year. In the past the main population has exceeded 20,000 individuals, making the task of counting these small annuals a challenge.

Whether the new populations will persist over time cannot be predicted now. Nevertheless, the establishment of a second population is significant because it reduces the probability of extinction due to catastrophe and moves the Point Reyes National Seashore one step closer to the long-term conservation of the Sonoma spineflower.

## Restoring a mixed-grass prairie and a cultural landscape

By Kurt Foote

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When a visitor stands at the overlook at Washita Battlefield National Historic Site in Oklahoma, he or she should gain a sense of the area as it appeared 132 years ago. In 1868 the U.S. Cavalry under Lieutenant Colonel George A. Custer attacked and decimated a Southern Cheyenne Indian village on the windswept plains along the Washita River. In the intervening years the former battle site has been ranched and farmed, but the rural character of the land has kept its integrity. Since acquiring the site in 1997, the National Park Service has sought to restore this cultural landscape by converting a 20th-century farm into a 320-acre (130-hectare) patch of mixed-grass, native prairie. The recent Natural Resource Challenge, with its emphasis on restoring native plant and animal species, gave the park added incentive to begin the restoration. During 2000 several projects undertaken at the park have led to progress in achieving this goal.

In order to restore natural conditions to this habitat, resource managers must first understand its current state. Toward that end, the park has entered into a contract with the University of Oklahoma to perform biological inventories of mammals, birds, reptiles, and amphibians currently on-site, and the first field sessions took place in summer 2000. Inventories of other major taxa, such as vascular plants and fish, will begin within three years as a result of the park's participation in the Inventory and Monitoring Program's park networks created through the Challenge. Information derived from these inventories will help determine which species should be restored to the landscape. In the meantime the first geographic information system maps of the park's native and exotic vegetation were produced this year with the assistance of specialists from the regional office.

The exotic vegetation documented by the mapping teams poses the most serious impediment to fully restoring the site. At least 15 aggressive weed species occur on-site and together occupy upwards of one quarter of the park's acreage. To gain a foothold in stemming the invasive tide, the park used its neighbors and the newly formed Chihuahuan Desert/Shortgrass Prairie Exotic Plant Management Team (EPMT) to great avail during the year. With the assistance of the USDA Forest Service, the park eradicated 4 acres (1.6 hectares) of black locust trees, and by combining the efforts of the EPMT and a tamarisk control crew from Lake Meredith National Recreation Area (Texas), removed over a mile (1.6 kilometers) of tamarisk from the south bank of the Washita River and elsewhere in the park.

At another location on this former battleground, the park is going beyond the removal of Old World bluestem, an introduced crop species. In a 57-acre (23-hectare) former pasture, a contracted farmer is repeatedly plowing under the nonnative forage grass to exhaust the seed source while annually planting winter wheat as a cover crop to reduce erosion. This is being accomplished in accordance with a plan drawn up under the guidance of the USDA Natural Resources Conservation Service. When this three-year process winds up in 2001, sorghum will be sown along with a mixture of native grasses that will mature into a replicate prairie grassland.

All of these restoration activities help contribute to Washita Battlefield's GPRA (Government Performance and Results Act) goal of protecting, restoring, and maintaining the natural and cultural resources of the site. More important, they help fulfill the Challenge's mandate to focus attention on the ecological integrity of parks and the restoration of native plant and animal life in the national park system.



▲ Acquired by the National Park Service in 1997, Washita Battlefield National Historic Site is being converted from a modern farm into a mixed-grass, native prairie. The restoration entails conducting biological inventories, exotic species control, and temporary planting of winter wheat (shown here). In 2001, native prairie grass species and sorghum will be planted to complete the process.



# Whitebark and limber pine restoration under way in Glacier

By Tara Williams

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Historically, whitebark (*Pinus albicaulis*) and limber pine (*P. flexilis*) communities were significant components on 15–20 percent of forested lands in Glacier National Park, Montana. However, due to the exotic white pine blister rust—a Eurasian fungus—and fire exclusion, whitebark and limber pine stands in the Northwest have been decimated over the last 90 years. Based on research conducted by the USGS Glacier Field Station, almost half of all whitebark pines in Glacier are dead. Of the remaining trees, 90 percent are lethally infected and will likely die in the next 5 to 15 years. One-third of their cone-bearing crowns are already dead. Scientists and park managers agree that whitebark and limber pine will be functionally lost in Glacier without active management intervention. In 2000 the first trees were planted in an effort to begin restoration of these communities.

Whitebark and limber pine are important to many wildlife species. The grizzly bear (threatened under the Endangered Species Act) raids middens of cones stored by red squirrels. During good cone-crop years, whitebark seeds are among the most important food sources for bears, encouraging them to keep to higher elevations and away from developed areas. Clark's nutcrackers deposit whitebark seed in caches; these caches, particularly those deposited in recently burned areas, provide ideal germination conditions for the conifer. Whitebark are able to germinate at higher elevations and under harsher conditions than other conifers, thus establishing tree line. Their spreading branches catch and retain snow, and their shelter provides suitable conditions for subalpine fir germination. Restoration of whitebark and limber pine communities will preserve a number of significant ecological processes.

Over the past three years, Glacier has received funding through the Intermountain Region Natural Resource Fund for whitebark and limber pine restoration. Resource managers have collected seed from healthy trees in otherwise blister rust–decimated stands. Preliminary research by the USDA Forest Service (USFS) indicates that these healthy trees have natural genetic resistance to the rust. This year more than 17,000 limber pine seeds were collected. From collected seeds, stock has been raised in Glacier's native plant nursery, a cooperative nursery at the Blackfoot Tribe's Blackfoot Community College, and in the USFS Coeur d'Alene Nursery. In 2000 more than 3,800 trees were produced by the nurseries

and are ready for planting. Appropriate planting locations are selected by overlaying geographic information system layers of recent wildland fires for resource benefit with a map of whitebark pine habitat.



◀ A biological technician in Glacier National Park places wire mesh cages over whitebark pinecones, protecting them from predation by Clark's nutcrackers. Seeds are extracted from the mature cones once they are collected; they are planted and raised in the greenhouse until the disease-resistant seedlings are ready for transplanting in the park.

As the disease travels south, more districts and agencies have become concerned. Whitebark is considered one of four major food sources for grizzlies in the greater Yellowstone area (GYA), and the health of this species is one of the factors that will affect decisions regarding delisting grizzlies in the northern Continental Divide ecosystem. The Coeur d'Alene Nursery began raising whitebark for a few USFS districts and Glacier. They currently have orders to produce 100,000 trees for the GYA. They are beginning work with limber pine, which has received less attention but appears to be following the same path.

In September 2000 the first on-the-ground restoration work was completed in Glacier. One hundred trees were planted shortly after a burn that occurred in whitebark habitat. Planted trees are mapped and marked for future monitoring. The extreme fire season of 2000 precluded additional planting of trees this season, but they will be overwintered and planted as soon as snowmelt allows. Through this project there is hope that whitebark and limber pine ecosystems will persist for the benefit and enjoyment of future generations of humans, Clark's nutcrackers, and grizzly bears.

## Scientific review of research on mountain goats in Olympic



On 21 July 2000 the National Park Service announced the availability of an independent report titled "Review of Scientific Material Relevant to the Occurrence, Ecosystem Role, and Tested Management Options for Mountain Goats in Olympic National Park." This review, conducted by the Conservation Biology Institute of Corvallis, Oregon, under contract to the Department of the Interior, is available on the Internet at [www.consbio.org](http://www.consbio.org). The report found that the available evidence supports the view that the mountain goat (*Oreamnos americanus*) has never been native to the Olympic Peninsula in Washington. The probability that the mountain goat naturally colonized the peninsula in the past is relatively low. The review team noted that although mountain goats are certainly having some effect, substantial and harmful impacts at the population, community, and ecosystem levels have not been established. The team indicated that this does not mean that significant impacts have not occurred, but only that the studies fail to distinguish goat-caused impacts from effects of natural physical factors such as wind, freeze-thaw cycles, or water erosion. The team also stated that control of mountain goats within the park would be both prudent and feasible.



# Endangered bonytail returns to the wild

By Stephen Petersburg

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On 13 July 2000, one of the West's rarest fish species was returned to the Green and Yampa Rivers. Five thousand hatchery-reared juveniles of the endangered bonytail (*Gila elegans*) were released in the lower Yampa near Echo Park in Dinosaur National Monument, and another 5,000 were released in lower portions of Browns Park in the Browns Park National Wildlife Refuge and in the national monument. These releases will be augmented by additional future releases in an attempt to reestablish wild populations of bonytails.

One of four endangered large-river fishes in the Colorado River system, the bonytail had been virtually extirpated from wild riverine habitats. The other three endangered species are the Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and humpback chub (*G. cypha*). The State of Utah listed the bonytail as protected in 1974, while Colorado listed it as endangered in 1976. In 1980 the bonytail was federally listed as endangered under the Endangered Species Act of 1973.

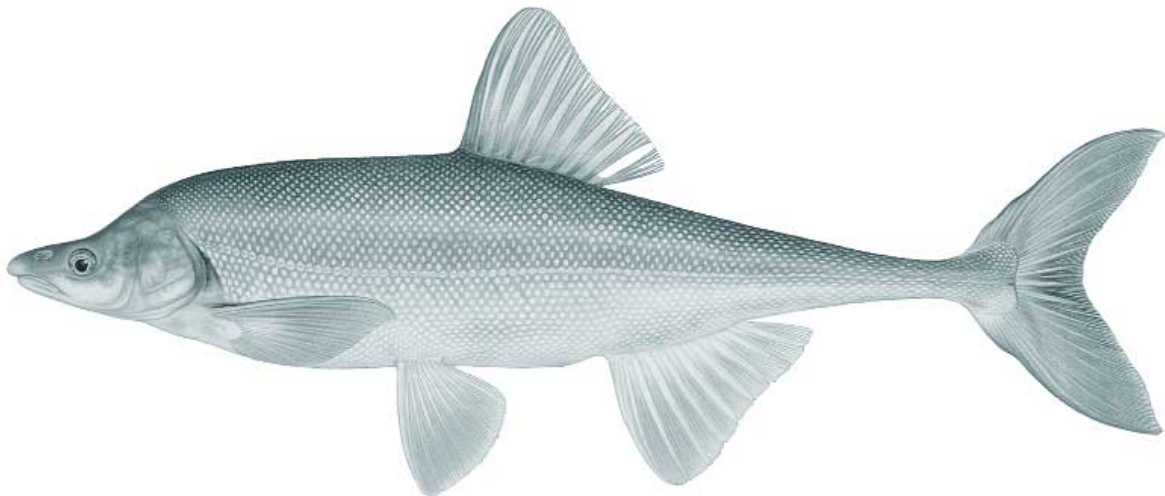
*"Stocking the rivers with  
bonytail is a cooperative  
undertaking..."*

The bonytail is a member of the minnow family Cyprinidae. It has a streamlined body that narrows markedly toward the tail. Its back is gray or olive, its sides are silvery, and its belly is white. Its large fins are also characteristic of the species. Bonytails may reach lengths of greater than 24 inches (61 centimeters) and may live

nearly 50 years. They are closely related to other chub species in the Colorado River system, and intergrades with the humpback chub and the roundtail chub (*G. robusta*) have frustrated geneticists for many years.

Dams in major river channels, such as the Flaming Gorge and Glen Canyon Dams, are the proximate cause of the decline of endangered Colorado River fishes. Dams alter many characteristics of riverine habitats, and the new habitats favor nonnative fish species, many of which compete with or prey on the endangered species. The bonytail was once common from the lower reaches of the Colorado River to well upstream of Dinosaur National Monument. One of the last riverine areas that wild bonytails occupied into the late 1960s was around Echo Park. Remnant populations have persisted in reservoirs in the lower Colorado River basin and in hatcheries.

Stocking the rivers with bonytail is a cooperative undertaking by the U.S. Fish and Wildlife Service, National Park Service, Colorado Division of Wildlife, and Utah Division of Wildlife Resources. The bonytails were raised in the Wahweap Fish Hatchery of the Utah Division of Wildlife Resources near Page, Arizona. The Colorado Division of Wildlife and the U.S. Fish and Wildlife Service transported the fishes to the release sites, where the National Park Service assisted with the releases. The agencies are members of the Upper Colorado Recovery Implementation Program, which consists of federal and state agencies, environmental groups, and water- and power-user organizations in Colorado, Utah, and Wyoming. The goal of the program is the recovery of endangered fish species while allowing development of water resources for human uses.



▲ Endangered bonytail, which can reach 24 inches in length, were restored to Dinosaur National Monument in 2000. Copyright Joseph R. Tomelleri

## Award-Winner Profile

## Dinosaur National Monument resource manager honored



▲ Stephen Petersburg

Stephen Petersburg, Resource Manager at Dinosaur National Monument (Colorado and Utah), received the 1999 Director's Award for Natural Resource Management in June 2000. Steve raised national park values and concerns throughout the complex negotiations for the life and health of the Green River and its tributary, the Yampa. During the year, he was the key player in creating a vision for improved stewardship of river resources below Flaming Gorge Dam. Steve was also largely responsible for the successful recovery of peregrine falcons (*Falco peregrinus anatum*) in the monument; his pioneering efforts increased the number of breeding pairs from two in 1977 to more than a dozen in 1999. In addition, Steve initiated groundbreaking work with prescribed fire in the natural ignition season (summer) with stunningly successful results.

Steve recognizes the importance of partnerships to success in managing park resources. "Virtually all of our activities, [from] fire to peregrines to endangered fish, are conducted in interagency arenas. With river and fish issues alone, we deal with several ... groups ... both in one-to-one interactions and in ... formal groups (e.g., recovery teams, Yampa River Basin Partnership, Flaming Gorge Work Group). In all of these, we are now full partners.... I spend a lot of time in meetings, but we cannot accomplish anything lasting by ourselves."

Like many of the award-winners, Steve recognizes many other people who contributed to the monument's resource management program. "The credit for the award should go to a lot of other people—Tom Zimmerman and others in the fire arena, Jerry Craig (Colorado Division of Wildlife) for the peregrine work, and the NPS Water Resources Division and others related to the river and fish work. I credit them with much of the work and ideas that have shaped my participation in these programs."



## Milestone reached in the removal of Elwha and Glines Canyon Dams



The Elwha River Ecosystem and Fisheries Restoration Act of 1992 authorized the Secretary of the Interior to acquire and remove the Elwha and Glines Canyon Dams on the Elwha River, on the Olympic Peninsula of Washington. This action is being taken to restore the river ecosystem and native salmon and steelhead fisheries. The first major step in the restoration process, acquisition of the dams, was completed on 29 February 2000. The Bureau of Reclamation is operating the dams under NPS oversight until they are decommissioned and removed. Planning and design activities are under way to protect the water supplies of municipal and industrial users and for fisheries restoration and revegetation. More information can be found on the project website at [www.nps.gov/olym/elwha/home.htm](http://www.nps.gov/olym/elwha/home.htm).

◀ **Glines Canyon Dam** on the Elwha River, Olympic National Park, Washington.



# Restoration of Bonneville cutthroat trout populations in Great Basin

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✍ By Neal W. Darby

Since ancient Lake Bonneville dried up 8,000 years ago in what is now eastern Nevada and Utah, Bonneville cutthroat trout (*Oncorhynchus clarki utah*) have persisted in the isolated small mountain streams of the eastern Great Basin. Unfortunately, water diversions, subsistence harvest, and especially stocking with nonnative fish caused the extirpation of the Bonneville cutthroat trout from most of its range. The local extinction was so widespread that the U.S. Fish and Wildlife Service is now conducting a second status review for listing the trout under the Endangered Species Act of 1973. However, Great Basin National Park near Baker, Nevada, on the Nevada-Utah border provided a unique opportunity to promote conservation of the trout and potentially preclude the need for listing it in eastern Nevada.

The Bonneville cutthroat trout was believed to be extinct in Great Basin National Park because past surveys revealed only nonnative hatchery fish or hybrids of the Bonneville cutthroat and rainbow trout (*O. mykiss*). After the park established a reintroduction program for the trout in 1998, a survey in one stream system of the park in 2000 revealed only fish with strong characteristics of the Bonneville cutthroat trout. Subsequent genetic analysis of fin tissues confirmed the presence of a pure population of the species. The timely discovery of the trout was fortunate because cleansing of the stream system with chemicals to remove the nonnative trout and the hybrids that were thought to be there was planned as the next step in the reintroduction program. Instead of being inadvertently annihilated, the population is now being genetically compared with other populations of the Bonneville cutthroat trout in nearby streams. If appropriate, the preservation of the genetic stock that developed in the park will be attempted.



▲ **Conservation of the Bonneville cutthroat trout** in Great Basin National Park may preclude the need for listing the species as threatened under the Endangered Species Act.

With discovery of this population, a source stock became available for reintroductions elsewhere in the park. The park established a new population of Bonneville cutthroat trout in a stream of another watershed by transplanting 60 trout from the source stock. Another historical Bonneville cutthroat trout stream has been chemically cleansed to remove the nonnative fish and hybrids in preparation for a reintroduction of Bonneville cutthroat

trout in 2001. Private landowners adjacent to the park supported a more diversified fishery and allowed chemical cleansing of streams on their lands. The extension of cleansing beyond park boundaries may facilitate restoration of a native fishery throughout an entire watershed.



▲ **A stream survey** in Great Basin National Park, followed by genetic analysis in 2000, confirmed a pure population of rare Bonneville cutthroat trout. The local population subsequently became a source for restoration of the species in a different park watershed.

The intensive surveys to determine the need for chemical cleansing of streams in the park revealed not only the Bonneville cutthroat trout but also another group of sensitive species, the Great Basin spring snails (*Pyrgulopsis* spp.). To protect these sensitive organisms from adverse effects of chemicals, the park adjusts the timing and extent of chemical cleansing. Such proactive work prevents the need for listing the species under the Endangered Species Act. It also benefits neighboring federal land agencies, the state, private landowners, and the public by allowing continued multiple land use with fewer restrictions.

— NPS —



## Beyond Park Boundaries

### Working with park neighbors to protect habitat for anadromous fish

By Brannon Ketcham

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Effective management and protection of resources in national parks often require that natural resource managers seek the cooperation of landowners beyond the boundaries of parks. In 2000, the staff of Point Reyes National Seashore elicited the participation of landowners downstream in the protection of habitat for steelhead trout (*Oncorhynchus mykiss*) and the eventual reintroduction of coho salmon (*O. kisutch*) in the 9-square-mile (14.5-square-kilometer) Pine Gulch Creek watershed. Both species are federally listed as threatened.

The National Park Service manages the upper 75 percent of the Pine Gulch Creek watershed, which provides excellent habitat for steelhead trout and, historically, for populations of coho salmon, last documented in 1979. However, a successful reintroduction of the species hinges on improved management of riparian water to ensure survival of the fish during low water flow in summer when farmers withdraw water for agriculture. In 1997, park staff began to contact and visit each of the five organic farmers in the watershed to solicit cooperation for managed water withdrawal. Within one year, staff convinced the farmers of the merit of managed water withdrawal for agricultural sustainability and operational efficiency. In 2000 the National Park Service developed a water management plan and received \$125,000 of state and local grants for its implementation. The farmers and the National Park Service continue to meet every other month to work out details for the implementation of the plan.

The restoration is part of a five-year undertaking funded by the Natural Resource Preservation Program of the National Park Service. Water of the Pine Gulch Creek must continue to meet agricultural needs. To ensure sufficient water flow for the survival of fish in late summer, staff of Point Reyes National Seashore and organic farmers in the Pine Gulch Creek watershed designed off-stream riparian water-storage ponds and selected lower-rate diversion pumps. Stored water in the ponds and the pumps will allow farmers to balance the effects of pumping throughout the growing season and to stop withdrawal from the creek before flows in the lower watershed become critically low. Implementation of the designed infrastructure will facilitate

adaptive water management on the property of legal water users and protect essential water flow for the federally listed threatened steelhead trout.



▲ **Star Route Farms** is one of five organic farms adjacent to Point Reyes National Seashore that use water from Pine Gulch Creek, a habitat for steelhead trout and a potential restoration site of coho salmon. In 2000 the National Park Service and farmers agreed on a plan to manage use of the water within the creek in a more sustainable manner that will benefit the farmers and protect habitat of steelhead trout and coho salmon.

The farmers have committed to cooperate with Point Reyes National Seashore and other regulatory agencies to ensure implementation of the design. Construction is expected to begin in summer 2001 after all necessary permits have been obtained. When the infrastructure is in place, the National Park Service, the National Oceanic and Atmospheric Administration–Fisheries, and state and local agencies will coordinate to reintroduce a population of federally listed threatened coho salmon into the watershed.

Finding solutions and designing plans that meet multiple and seemingly opposing needs are never easy. Eliciting the cooperation of neighboring landowners and formulating a water management plan that meets the needs of both the fish and farmers were often frustrating for all participants, and at one time stalled for nine months. The implementation of the project is the result of all participants' persistence, patience, and understanding of one another's needs.

## Point Reyes and Golden Gate take first step in restoring wetlands



▲ **Tomales Bay at low tide**, Golden Gate National Recreation Area, California. Copyright, 1994, Bruce Farnsworth

In February 2000 the National Park Service, with additional funding from the California Department of Transportation, acquired the 560-acre (227-hectare) Giacomini Dairy. Located at the head of the ecologically sensitive and significant Tomales Bay within the Northern District of Golden Gate National Recreation Area, the property has separated Lagunitas Creek from the bay and confined the estuary to the leveed stream channel for nearly 60 years. This acquisition is the first step in reversing this trend and will lead to full-scale restoration when the land is relinquished in 2007. The restoration of the tidal wetland and floodplain habitat will add significantly to the already diverse aquatic and terrestrial ecology of Point Reyes National Seashore and Golden Gate National Recreation Area. In addition to their herring runs and oysters, Tomales Bay and the Lagunitas Creek estuary are vital to anadromous fish, catadromous fish, and marine aquatic species. Lagunitas and Olema Creeks, which flow through the property, are passages for nearly 10 percent of the remaining federally threatened coho salmon (*O. kisutch*) in central California.

